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ABSTRACT

Standardized college-level tests of thinking have serious drawbacks, but they can be used effectively to compare results with other teachers or researchers and to suggest possible ways of measuring aspects of thinking in faculty-constructed tests. Faculty-designed tests should provide opportunities for students to use the important knowledge and skills of the course in a context different from the one in which the knowledge and skills were taught. The assessment device should be tied to particular subject matter areas and should be open-ended. A major problem in testing thinking in college classes is that a test may measure different aspects of cognition for different students. Several college-level critical thinking and intellectual development tests are briefly described, and six references are included. (JDD)

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IMPROVING COLLEGE TEACHING AND LEARNING

Assessing Growth in Thinking in College Courses: A Caveat

As educators increasingly stress the importance of teaching students how to think critically, they naturally ask, "How can we measure the results of our effort?" For many, the first impulse may be to look for existing validated tests. Standardized intelligence tests measure such thinking skills as induction, deduction, and making inferences. In addition, several objective, machine-scorable, college-level tests of thinking currently exist. But when college teachers consider using such tests, they should be aware of two important points and the serious drawbacks they suggest:

1. Thinking depends on factual knowledge in the subject area in which the thinking is required. General tests of thinking, such as intelligence tests, contain items that require a student to use knowledge available to everyone. These tests are not sensitive to the development of thinking as it relates to a specific course or field of knowledge.
2. Some of the most valuable kinds of thinking involve open-ended problems for which there are many equally appropriate responses or solutions. Objective tests may not reveal this kind of thinking because they are scored for a particular right answer. Further, such tests do not assess the processes a student used to arrive at his or her solution.

What Are the Alternatives to Existing Tests?

Because of the limitations of existing tests, most faculty members who want to assess thinking in their own classes may be best served by tests they construct themselves. These tests should provide opportunities for students to use the important knowledge and skills of the course in a new context — a context different from the one in which the knowledge and skills were taught. For example, through essays, interviews, simulations, discussions, and other such techniques, students can be asked to use what they have learned to solve a problem they haven't encountered before — a problem that can't be answered simply by recalling what the teacher or the textbook said.

Current NCRIPTAL research with faculty members who teach biology, social science, or English courses shows that some faculty members already include measures of thinking in their course assignments and tests. As we review the measures of thinking they use, we find that most faculty members' test questions, reports, papers,

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or simulations can be sorted into three categories, each one representing the type of thinking the test question or assignment requires of the students:

1. Recognition and recall
2. Comprehension and simple application
3. Critical thinking and problem solving

We believe that if faculty members analyze their tests and other measures using this simple categorization scheme they will be encouraged to analyze the relationship between their goals and their assessment techniques more systematically. They may find that their tests contain much less at Level 3 than they intended. As a side benefit, faculty will also be better able to clarify for students their expectations for student thinking — and this clarification has been found to improve learning.

How to Use Existing Tests

In spite of the drawbacks, existing standardized tests can be used effectively in several ways. They provide opportunities for teachers or researchers to compare results with others. More importantly, such tests can help faculty members design their own measures of thinking by suggesting the variety of aspects of thinking and possible ways of measuring them.

The 1980 Watson-Glaser Critical Thinking Appraisal, for example, includes subtests to measure five types of thinking: inference, recognition of assumptions, deduction, interpretation, and evaluation of arguments. The Cornell Critical Thinking Test: Level Z, focuses on induction, credibility, prediction, experimental planning, fallacies, deduction, and identification of assumptions. A third instrument, Chickering's Critical Thinking Behaviors inventory, asks students to report the percentage of study time spent on each of six activities: memorizing, interpreting, applying, analyzing, synthesizing, and evaluating.

Linking Tests to Subject Matter

Since critical thinking is so intimately related to specific knowledge, most educational purposes may be served better by assessment devices tied to particular subject matter areas. For example, McKeachie, Slater, Smith, and Hiler developed a test for psychology that included eight subtests: tendency to make value judgments, distinguishing between empirical and non-empirical problems, choosing testable hypotheses, interpreting graphs, deriving warranted conclusions, discriminating between reasonable conclusions, detecting implicit assumptions, and designing simple experiments. For mathematics, Schoenfeld devised a test in which students are asked which heuristic they would use in solving twelve different types of problems.

Using Open-Ended Measures of Thinking

Open-ended measures of thinking typically allow students to demonstrate the most valuable kind of thinking — the kind that most often is used to make decisions and solve problems in real-life situations. Perry's (1970) theory of cognitive and ethical development during college has stimulated a number of researchers to design assessment techniques that measure students' movement through the Perry stages, which go from dualism through relativism to commitment. These techniques are also related to thinking and problem solving. Knefelkamp (1974) and Widick (1975), for example, created the Measure of Intellectual Development, an essay test involving decision making, careers, and classroom learning. And Kitchener and King (1981) have developed the Reflective Judgment Interview, in which an interviewer asks a student questions about a moral or ethical dilemma presented orally and in writing.

Winter, McClelland, and Stewart (1982) developed two tests of thinking: the Test of Thematic Analysis and the Analysis of Argument. The Test of Thematic Analysis asks students to read two groups of stories and to formulate and explain the differences between the two groups. This test measures a student's ability to form complex concepts and then to explain these concepts in his or her own words. The Analysis of Argument asks students to read a piece that expresses a strong position on an emotional and controversial topic. Then students write two responses: the first argues against the position they have read about and the second argues for it.

The American College Testing Program (Steele, 1986) has also developed a measure of reasoning as part of its College Outcome Measures Program (COMP). COMP uses written and audiotaped stimuli to which subjects respond by writing letters, for example, to a legislator, or by role playing and speaking to a friend or group. COMP assesses the students' identification and clarification of principal issues, costs and benefits, and potential problems and solutions.

Where Are We Now?

The major problem in testing thinking in different college classes is that a test may measure different aspects of cognition for different students. For example, students might fail items intended to measure analytic or evaluative skills because they have inadequate knowledge and not because they lack the relevent thinking skill. On the other hand, if the instructor has worked the problems in class before giving the test, then a test intended to measure high-level problem solving may simply be a test of rote memory. Nevertheless, essays, interviews, or simulations are likely to provide more opportunity for the kind of thinking we hope college develops.

Clearly much research is needed to develop effective evaluation tools for college faculty members to use in assessing the achievement of educational goals for improving students' thinking — particularly in assessing thinking skills that students need to attack the ill-structured problems they will face in real-life situations.

— Kathleen A. Hart

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